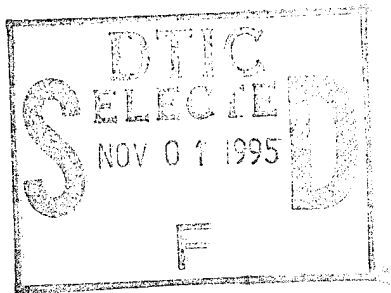


FIELD EMITTER ARRAY BASED DICKE SWITCH ARRAY FOR MM-WAVE



RADIOMETRIC SYSTEMS

Contract No: N00014-94-C-0243

MONTHLY REPORT NO. 3

Period Ending December 1994

Prepared For

BALLISTIC MISSILE DEFENSE ORGANIZATION

OFFICE OF NAVAL RESEARCH

CODE 251A

BALLSTON TOWER ONE

800 NORTH QUINCY STREET

ARLINGTON VA 22217-5660

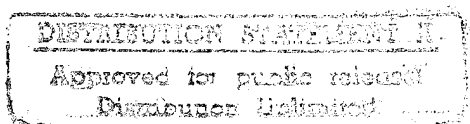
Prepared By.

Princeton Microwave Technology Inc.

3564 Quakerbridge Road

Mercerville. NJ 08619

DATA QUALITY IMPROVED



19951031 035

TASK 1.3. Software Analysis of Array.

The preliminary analysis of the array has been completed. Based on this analysis an array has been designed and a prototype circuit is being readied. The array will be first tested statically so that its performance is documented for comparison later. In order to conduct the testing of the array, illumination and receiving horn antennas at 30 Ghz have been designed . Once the transmission characteristics of the array have been completed, the final array with the switches will be implemented to test the overall objective of the program.

TASK 2.0 Fabrication

A preliminary design of the array has been completed. A prototype array has been layed out for fabrication in order to test its transmission characteristics. The Experiment will consist of the array illuminated by circular horn for the source and the energy will be received by a second circular horn, after it has passed through the array. The design of the horns have also been concluded and submitted for fabrication.

Plans for next month:

During the next month the testing of the switch will be completed. It is expected to complete the testing of the switch array in its transmission mode.

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Distribution /	
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A-1	

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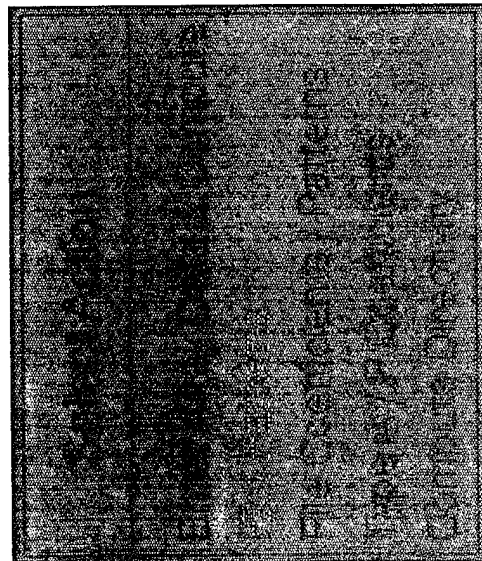
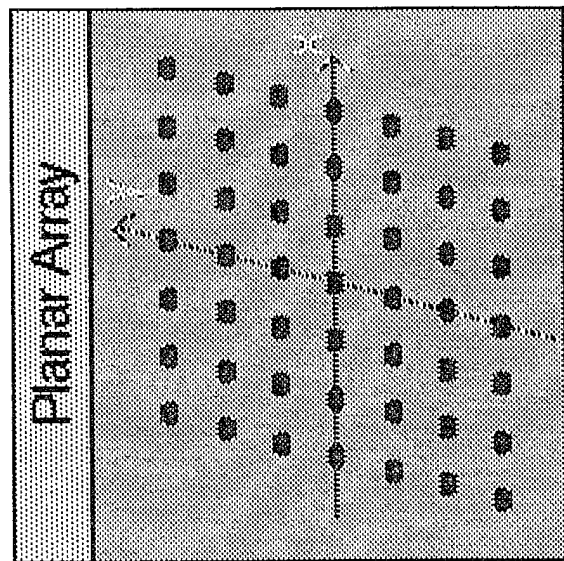
Figures 1 and 2 shown the specificatons of the planar array and its radiation pattern. Figures 3,4,5 and 6 detail the design parameters associated with the test horn antennas.

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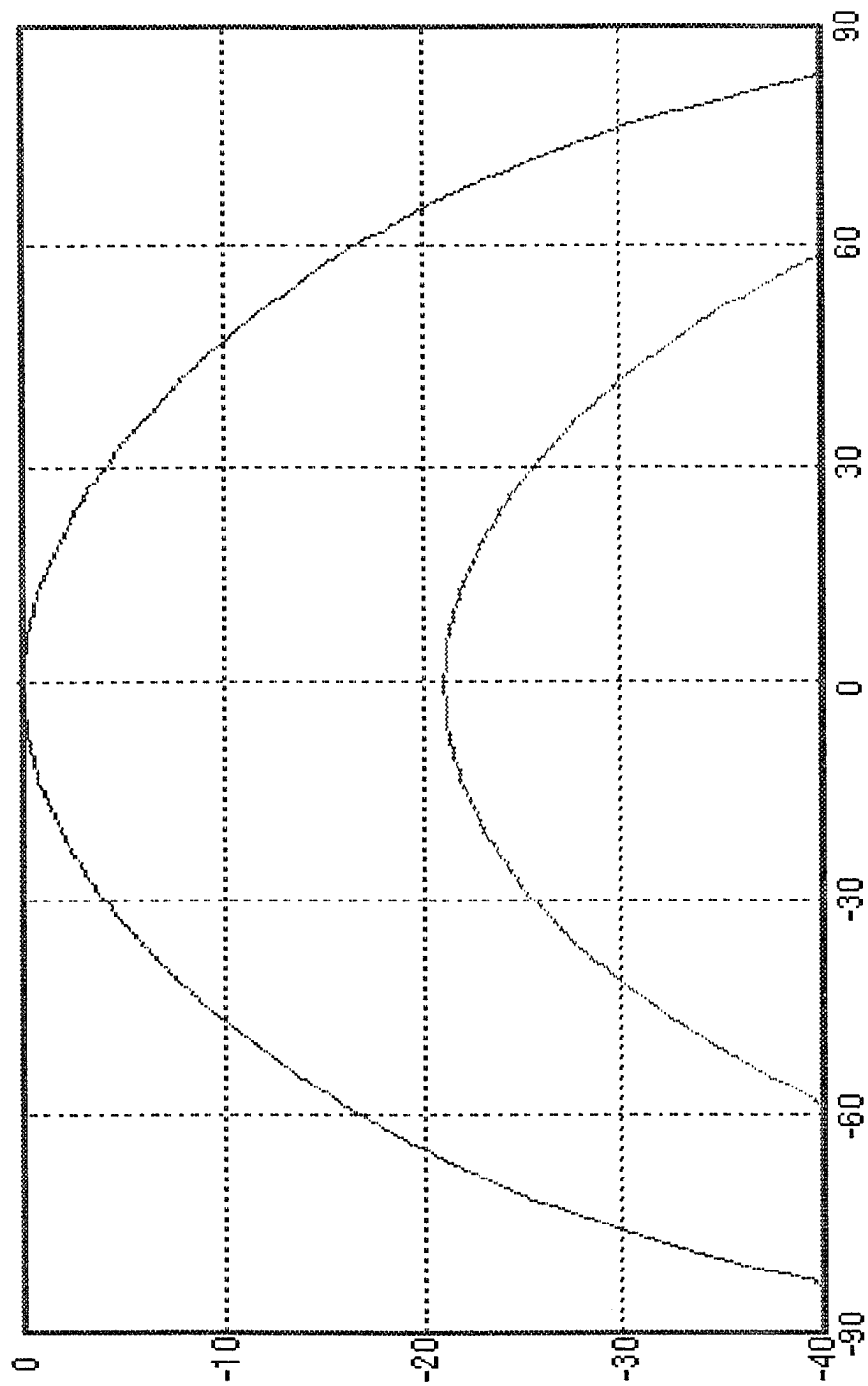


Array Specifications	
Number of elements	in x: 2 in y: 2
Element spacing (cm)	in x: .5 in y: .5
Operating frequency (GHz):	30
Amplitude Distribution: Uniform	
Phase Distribution: Broadside Beam	
Phase shift in x:	0.0 in y: 0.0
Scan angle:	$\theta = 0.0 \quad \phi = 0.0$ deg.
Element type: Rectangular Patch	
Polarization of elements: (X/Y)? X	
Resonant length (cm): .3	
Patch width (cm): .3	
Pattern cut: ϕ (deg)= 5	
Pattern increment (deg): 1	

Use ↑ and Enter for menus;

Esc to backup or quit

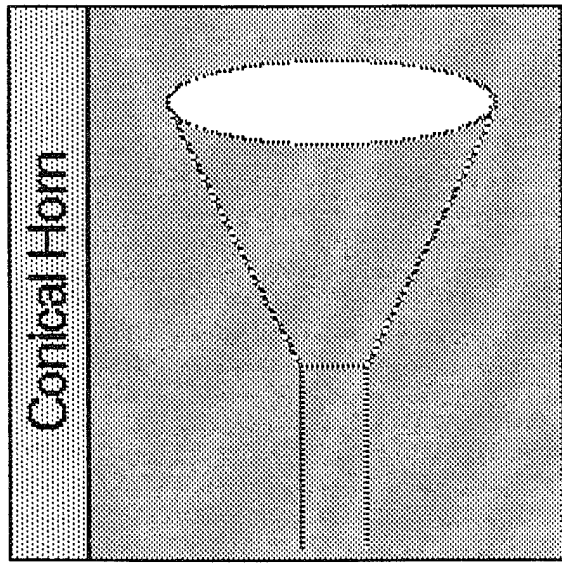
FIGURE 1: 2 x 2 ARRAY AT 30 GHz



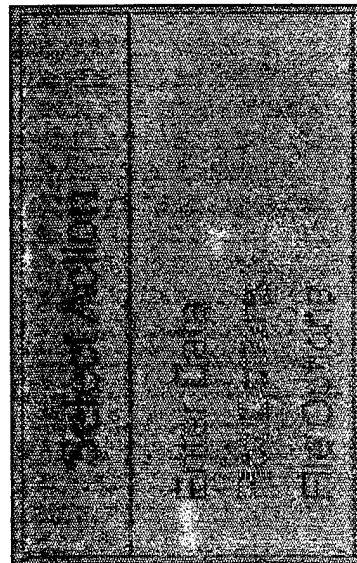
Use \leftrightarrow to move cursor
 PrtSc for EGAD
 Esc to quit

E-theta = 0.00 dB
 E-phi = -21.16 dB
 at Theta= 0.0 deg.

FIGURE 2: Pattern Associated
 with Figure 1



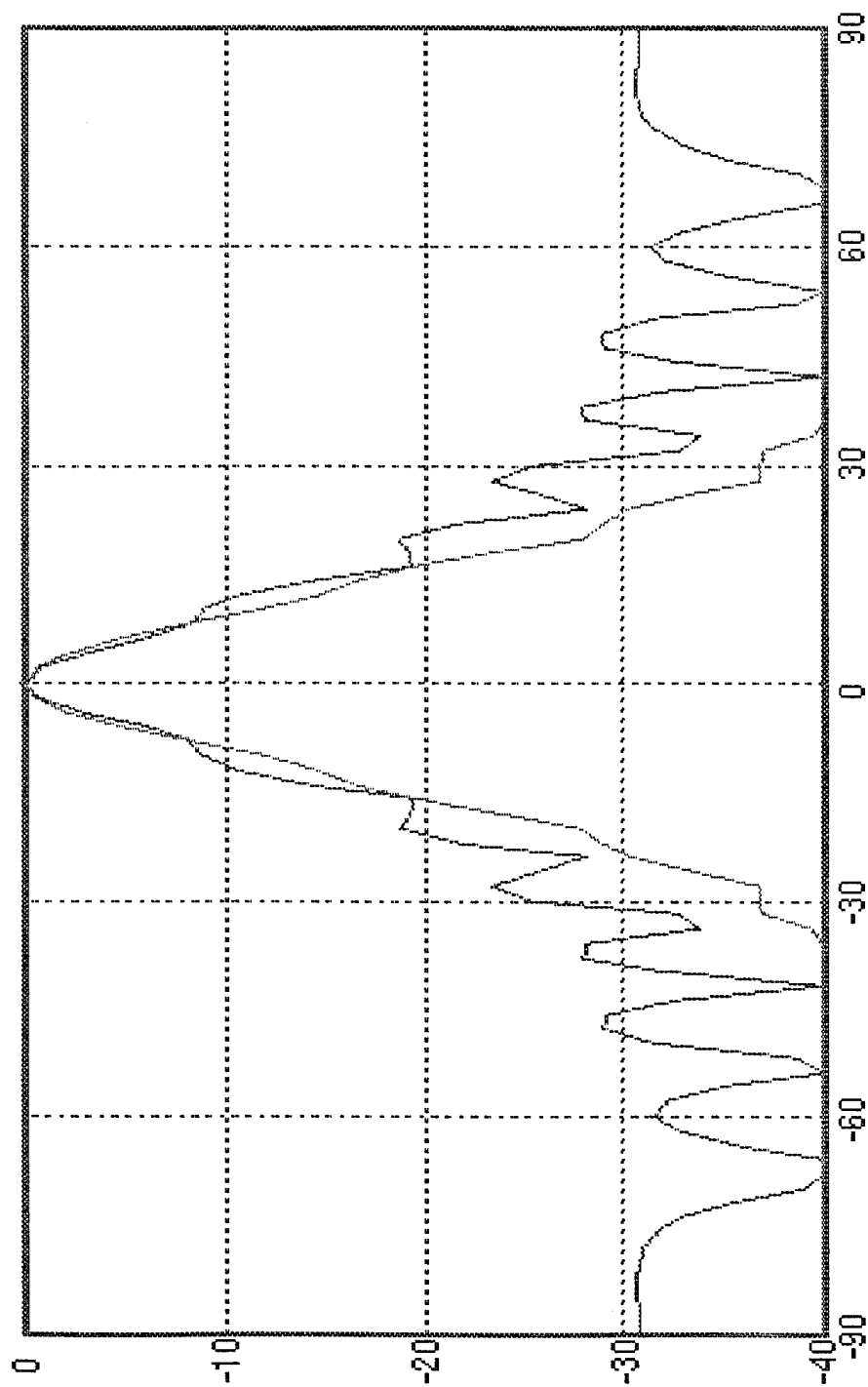
Input Data
Enter the frequency (GHz): 30
Enter aperture radius (cm): 3.9
Enter axial horn length (to apex)(cm): 20
Enter pattern increment (deg): 2



Horn Characteristics
Maximum phase error is 136.9°
Optimum aperture radius is 3.9 cm
The directivity is 24.8 dB

Use ↑ and Enter for menus; Esc to backup or quit

Figure 3: 'Illuminating Horn at 30 GHz

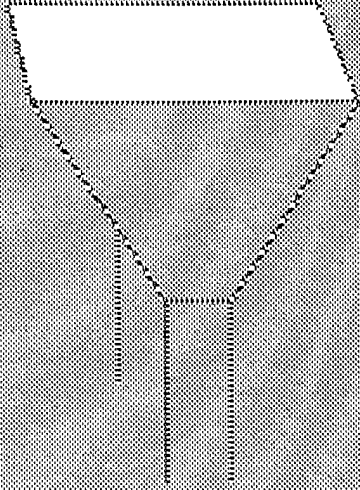


Use \leftrightarrow to move cursor
 PrtSc for EGAD
 Esc to quit

E-plane = 0.00 dB
 H-plane = 0.00 dB
 at Theta= 0.0 deg.

Figure 4: Pattern of illuminating Conical Horn

E-plane Sectoral Horn



Input Data

Enter the frequency (GHz): 30
Enter E-plane aperture dimension (cm): 6
Enter H-plane aperture dimension (cm): 6
Enter axial horn length (to apex)(cm): 20
Enter pattern increment (deg): 2

Plot Options

Plot type (P/R): R

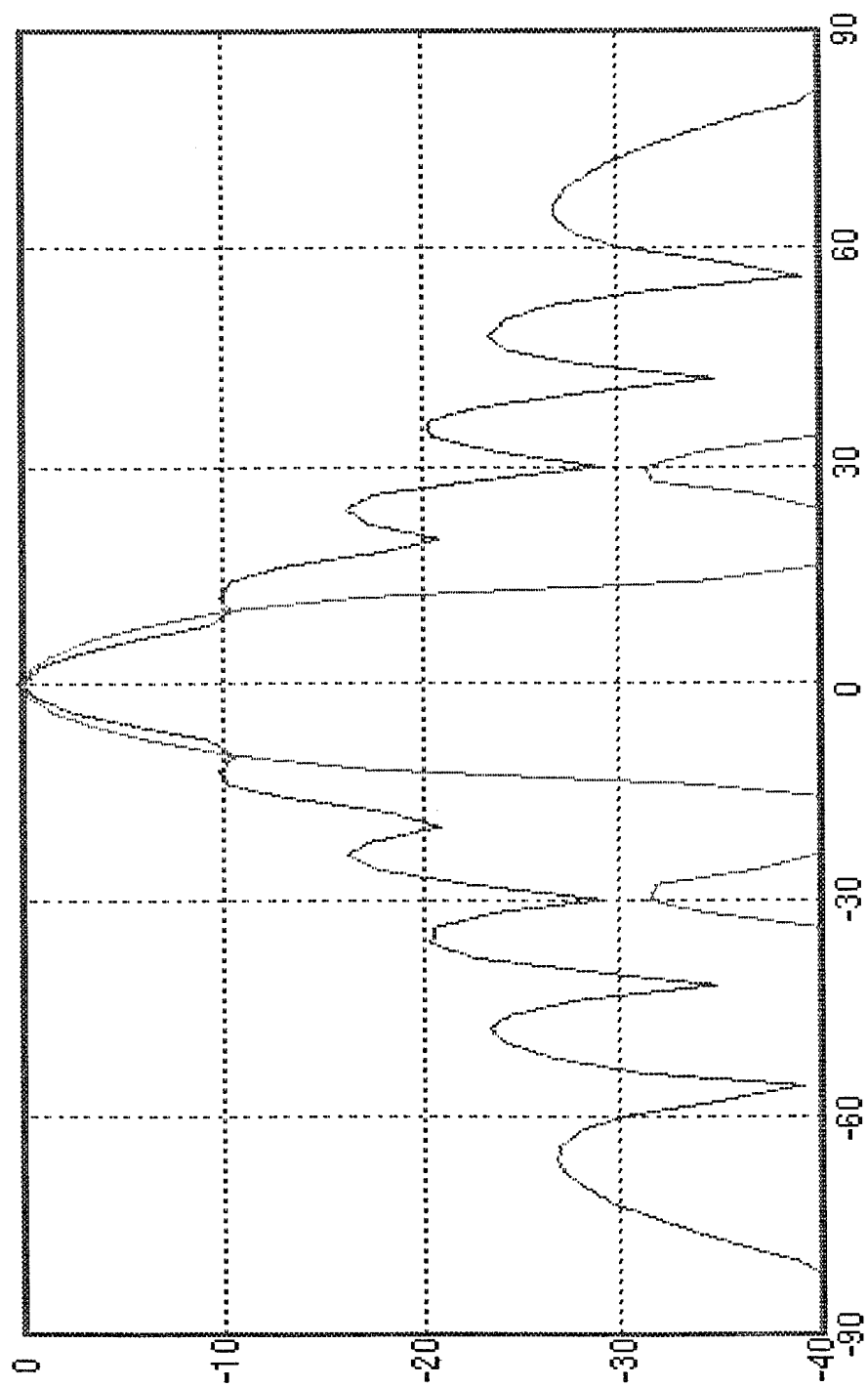
Horn Characteristics

Maximum phase error is 81.0°
Optimum E-plane dimension is 6.3 cm
The directivity is 24.9 dB

Use ↑ and Enter for menus;

Esc to backup or quit

Figure 5: *illuminating* H_{an} at 30 GHz



Use \leftrightarrow to move cursor
 PrtSc for EGAD
 Esc to quit

E-plane = 0.00 dB
 H-plane = 0.00 dB
 at Theta= 0.0 deg.

Figure 6: Pattern of Rectangular illuminating
 Horn at 30 GHz.



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DEFENSE TECHNICAL INFORMATION CENTER
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REFER TO

DTIC-OCC

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CORPORATE PROGRAMS DIVISION
ONR 353
800 NORTH QUINCY STREET
ARLINGTON, VA 22217-5660

1. Reference: DoD Directive 5230.24, Distribution Statements on Technical Documents, 18 Mar 87.

2. The Defense Technical Information Center received the enclosed report (referenced below) which is not marked in accordance with the above reference.

MONTHLY REPORT #3
N00014-94-C-0243
TITLE: FIELD EMITTER ARRAY
BASED DICKE SWITCH ARRAY FOR
MM-WAVE

3. We request the appropriate distribution statement be assigned and the report returned to DTIC within 5 working days.

4. Approved distribution statements are listed on the reverse of this letter. If you have any questions regarding these statements, call DTIC's Cataloging Branch, (703) 274-6837.

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GOPALAKRISHNAN NAIR
Chief, Cataloging Branch

1995 1031 035

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(Reason)

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DEPUTY DIRECTOR
CORPORATE PROGRAMS OFFICE

Debra T. Hughes
(Signature & Typed Name)

(Assigning Office)

(Controlling DoD Office Address,
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19 SEP 1995

(Date Statement Assigned)